MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures

SOP #: MDNR-WQMS-013 EFFECTIVE DATE: January 10, 2002

SOP TITLE: Procedures for Using the Smith-Root, Inc. Boat-Mounted Electrofishing Unit

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SUMMARY OF REVISIONS: Not applicable. This is a new SOP.

APPLICABILITY: The procedures described in this SOP are applicable to all ESP personnel who use the Smith-Root boat-mounted electrofishing unit.

DISTRIBUTION: MoDNR Intranet
ESP FSS Section Chief
ESP SOP Coordinator
ESP WQMS Section Chief

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 SCOPE AND APPLICABILITY

This SOP describes the procedures to be followed by Environmental Services Program (ESP) personnel when using the Smith-Root, Inc. boat-mounted electrofishing unit (see page 7). The unit may be used on surface waters of sufficient depth (>2.5 ft.) to operate the outboard motor.

2.0 SUMMARY OF METHOD

Fish are collected for both tissue analysis (as indicators of ambient water and sediment quality) and other aquatic studies (population surveys, etc.). Fish are primarily collected by means of commercially manufactured electrofishing units. The ESP utilizes either a boat-mounted unit manufactured by Smith-Root, Inc. or a backpack mounted unit manufactured by Coffelt Industries. This SOP details the set-up and operation of the boat-mounted unit.

3.0 HEALTH AND SAFETY REQUIREMENTS

3.1 General safety issues to be addressed prior to sampling should include knowledge and experience in safe boating practices (see Department of Public Safety, Missouri State Water Patrol, *Missouri Watercraft Manual*) and the proper operation of the boat-mounted electrofishing unit. Members of the sampling crew (composed of the team leader and sampling assistant) must be aware of the hazards inherent in working on and in water with electrical current. It is the responsibility of the team leader to inform the sampling assistant of proper safety procedures and techniques used in operating the electrofishing equipment and the outboard motor and boat.

3.2 Personnel participating in collection activities should be certified in both the American Red Cross standard first aid and cardiopulmonary resuscitation. Participation in the MDNR medical monitoring program in accordance with the Air and Land Protection Division medical monitoring policy, is required.

3.3 Personal safety equipment including life jackets, rubber electrical linemen gloves, hearing protection, and rubber boots must be worn at all times during the electrofishing collection process.

4.0 PERSONNEL QUALIFICATIONS

Primary responsibility for safety while electrofishing rests with the team leader. Experience in the proper operation and maintenance of an outboard motor and boat is required. See the Outboard Marine Corporation *Operation and Maintenance Manual* for further details. The team leader must also be responsible for the start-up and operation of the boat-mounted electrofishing unit. The team leader of the sampling crew must have received formal training on the principles and techniques of electrofishing prior to use of the specialized electrofishing unit. Refer to the United States Fish and Wildlife Service (USFWS) manual entitled *Principles and Techniques of Electrofishing.*

5.0 SUPPLIES AND EQUIPMENT

The following supplies and equipment are needed to properly operate the boat-mounted Smith-Root, Inc. electrofishing unit.

- 14' jon boat with attached bow railing and electrofishing booms
- 9.9 or 15 h.p. outboard motor
- 6 gal. outboard gas tank
- electrofishing generator
- 2 metal arrays (electrodes)
- gas can for generator
- Smith-Root, Inc. current control box (see page 6)
- foot-operated remote switch (see page 6)
- 2 wood boat oars
- life jackets for each individual
- rubber boots for each individual
- rubber lineman gloves for each individual
- hearing protection
- first aid kit
- security chain
- fire extinguisher
- fish holding tank
- air horn
- bow and stern lights (for night/inclement weather)
- cellular phone
- specific conductivity meter

6.0 SET-UP AND STARTING PROCEDURES

6.1 The Smith-Root, Inc. boat-mounted electrofishing unit consists of a specially designed gasoline powered generator, a control unit to change the current from AC to DC and allows for modifying the level and pulse of the current, a foot-operated remote switch, and two booms with attached metal arrays (electrodes). Refer to the Smith-Root, Inc. document entitled *GPP Series Portable Electrofishers* and the Honda Motor Company *Owner's Manual GX120 – GX160* for further information. The generator, foot-operated remote switch, and control unit should not be exposed to inclement weather and care should be taken when transferring them from vehicle to boat.

6.2 All boat and electrical equipment must be properly loaded and assembled. The control unit, generator, and toolbox should be placed behind the middle boat seat. The generator should be secured on the platform provided and be grounded to the metal boat. This is accomplished by connecting the insulated wire from the generator to the boat's wing nut attachment on the port side of the boat hull. The two electrode booms should be unsecured from their traveling position (along the gunnels) and swung 180^{o}

into position at the bow. The booms are secured above the water line by chains and are held in position by tightening large wing nuts located at the base of each boom. (Refer to page 7 for a photo of the set-up.)

6.3 The generator is then connected to the **INPUT** of the control unit via the cable connection from the generator. (Refer to page 6 for a photo of the control unit.)

6.4 The boat-mounted anode and cathode connection is then attached to the **OUTPUT** of the control unit.

6.5 The final connection to the control unit is the cable from the foot-operated remote switch (to be operated by the sampling assistant).

(The cable connections are of a male/female variety so there is no confusion as to the proper hookup.)

6.6 Check the following settings on the control unit prior to starting the generator.

- Set the **OUTPUT MODE SELECTOR** switch to the *120 PPS DC*.
- Set the **PERCENT OF RANGE** to *10*.
- Set the **OUTPUT RANGE SELECTOR** switch to *low*.
- Set **EMERGENCY SHUTDOWN** switch to *on* and **ENUNCIATOR VOLUME** to *medium*.

6.7 The following items should be checked on the generator prior to the start of collection activities:

- Check the oil level and add S.A.E. 10w-30 detergent oil as needed. Do not overfill.
- Fill the gasoline tank with clean, fresh, regular grade unleaded gasoline. Do not overfill.
- Turn the fuel valve to the **ON** position.
- Move the choke lever to the **CLOSE** position (if the engine is warm the choke may not be needed).
- Move the throttle lever slightly to the left.
- Turn the engine switch to the **ON** position. Pulling the starter grip briskly will then start the engine.

6.8 After the team leader starts the generator the sampling assistant may activate the foot-operated remote switch at the bow of the boat. When the switch is activated, the high voltage indicator light and audio alarm from the control unit should come on. A slight deflection of the **AMMETER** should also be noticed.

6.8.1 Adjust the **PERCENT OF RANGE** and **RANGE SELECTOR** switch as necessary to achieve optimum response in the fish being shocked.

6.8.2 Do not adjust the **PERCENT OF RANGE** switch while the foot-operated remote switch is activated. Damage to the **PERCENT OF RANGE** switch may result from switching under load.

6.8.3 Do not operate the generator above the power ranges indicated on the **AMMETER** face as possible engine and generator damage may occur.

7.0 ADDITIONAL CONSIDERATIONS

7.1 The set-up of the electrofishing equipment described herein delivers a pulsed DC current which will effectively incapacitate fish (or animals and humans, for that matter) when in close proximity to the electrodes and boat. The electrical field is most intense close to the electrodes but can extend outward 10-20 feet.

7.2 A communication system of hand signals between the team leader and sampling assistant must be worked out prior to the start-up of any electrofishing equipment. These should include (at the minimum) signals for starting and stopping the application of current and also for the direction of boat movement (stop, forward, reverse, etc.).

7.3 The operation of the outboard motor and boat should be done slowly while electrofishing. Care should be taken to avoid sudden maneuvers and/or collisions with downed or submerged trees, rocks, or other obstructions.

7.4 All operations should be suspended during lightning or thunderstorms. Discretion is advised during periods of rain.

8.0 REFERENCES

Department of Public Safety, Missouri State Water Patrol, *Missouri Watercraft Manual*, August 1994

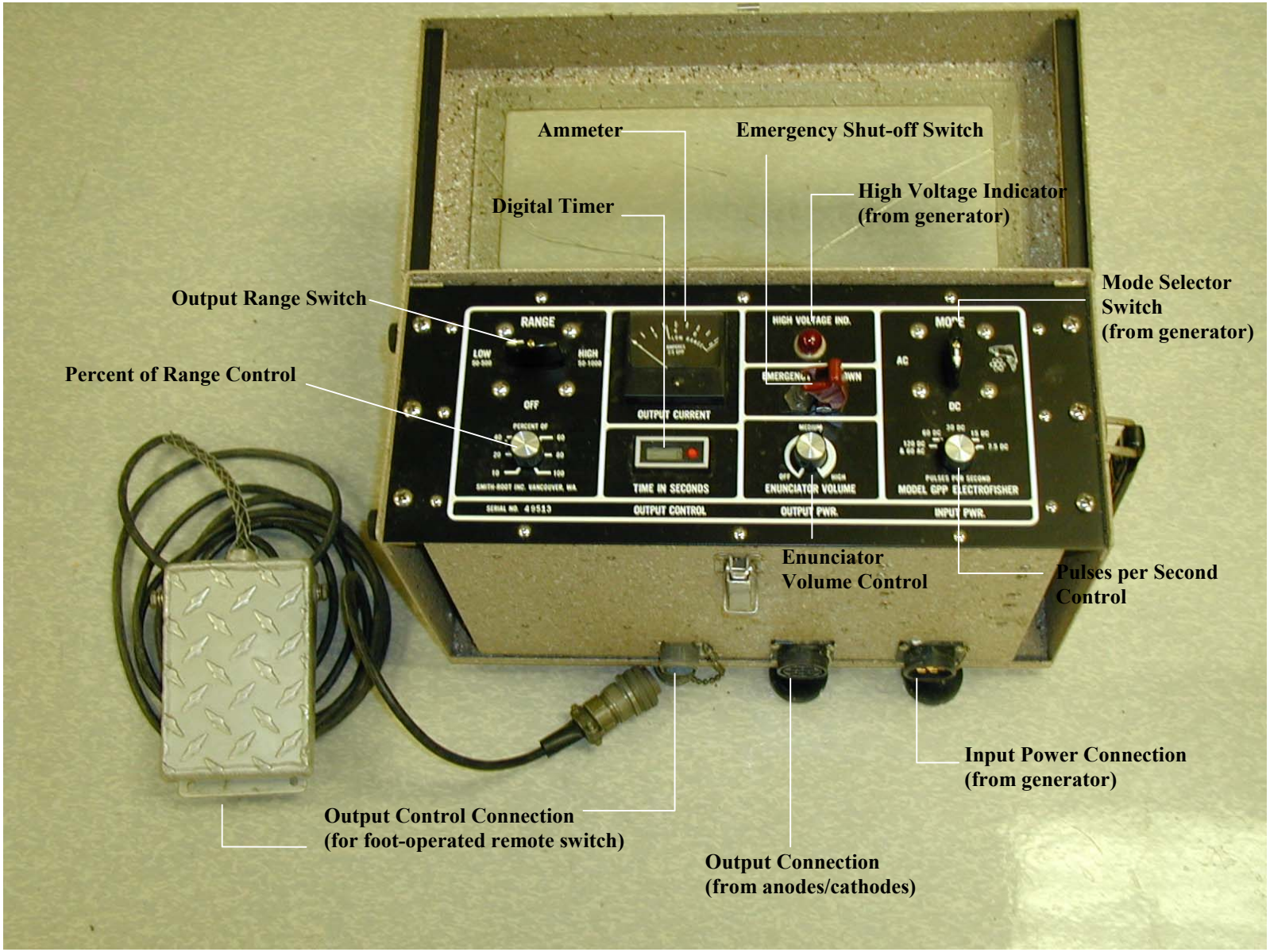
Honda Motor Company, L.T.D., Honda Power Equipment, *Owner's Manual GX120 – GX160*, 1990

Outboard Marine Corporation, *Operation and Maintenance Manual*, 1994

Smith-Root, Inc., *GPP Series Portable Electrofishers*

USFWS, Office of Training and Operations, *Principles and Techniques of Electrofishing*

Smith-Root 5.0 Portable GPP Control Box with Foot-Operated Remote Switch



Smith-Root, Inc. Boat-Mounted Electrofishing Unit